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# Surgical Anatomy and Feasibility Assessment of Internal Maxillary Artery to Upper Posterior Circulation Bypass Using a Superficial Temporal Artery Graft

Ali Tayebi Meybodi MD; Andre Payman; Halima Tabani MD; Dylan Griswold; Sonia Yousef; Roberto Rodriguez Rubio MD; Xiaoming Guo; Pooneh PhD Mokhtari; Michael T. Lawton MD; Arnau Benet M.D. University of California, San Francisco

## Introduction

The treatment strategy for insufficiency syndromes and complex aneurysms of the vertebrobasilar system may involve revascularization of the upper posterior circulation (UPC) (including the superior cerebellar [SCA] and posterior cerebral arteries [PCA]) [1]. There are multiple bypass options, each having their own merits and demerits [2-3]. However, there have been no previous assessments of the use of a superficial temporal artery graft (STAg) in a bypass from the internal maxillary artery (IMA) to the UPC. This study aimed to assess the surgical anatomy and feasibility of the IMA-STAg-UPC bypass.

## Methods

Fourteen cadaver heads were studied. The STAg was harvested proximally from about 15mm below the zygomatic arch using our previously described methodto harvest the infrazygomatic STA [4]. The lateral triangle of the middle fossa was used to expose the IMA (Figure 1) [5], and a subtemporal approach was used to complete the IMA-STAg-UPC bypass (Figure 2).

#### Results

The IMA-STAg-UPC bypass was successfully performed in all specimens (Figure 2). The average length of the STAg required for the IMA-STAg-SCA bypass was 46.4mm while that for IMA-STAg-SCA bypass was 49.5mm. Majority (83%) of the STAg had a diameter of >2mm distally with the average distal diameter of STAg being 2.3mm. The average diameters of the SCA and PCA were found to be 1.9mm and 3.0mm, respectively, at the point of anastomosis. Figure 1. Exposure of the IMA through the lateral triangle and completion of the IMA-STAg anastomosis



A-B, subtemporal exposure of the lateral triangle of the middle fossa. C-F, middle fossa craniectomy to expose and isolate the IMA. G-H, mobilization of the IMA stump from the infratemporal fossa to the middle cranial fossa. I-J, completion of IMA -STAg end-to-end anastomosis



A, middle fossa craniectomy. B, completion of IMA-STAg anastomosis. C, STAg-PCA end-to-side anastomosis. D, completed IMA-STAg-PCA anastomosis

# Conclusions

Our investigation reveals that the use of STAg for the proposed bypasses is anatomically feasible and provides a suitable caliber match between the bypass components. This study provides the anatomical basis for the clinical assessment of the proposed technique for the management of complex vertebrobasilar lesions. The proposed bypass may add to the current armamentarium of cerebrovascular surgeons for addressing complex lesions of the posterior circulation.

#### References

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### **Learning Objectives**

1.Description of our technique for harvesting IMAX without the need for zygoma removal2.Description of the technique and indications for an IMAX-UPC bypass